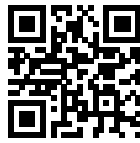


ECOsine® high power passive harmonic filter modules for system integration



- | Modular and highly compact filter concept
- | Cost-effective open panel design for cabinet integration
- | Optimized for motor drives with DC-link chokes
- | Helps to comply with international power quality standards
- | Supports an efficient utilization of electrical system capacity
- | Filters for diode rectifiers



Approvals



Typical application

Schaffner ECOsine® filters can be applied to virtually any kind of power electronics with front-end six-pulse rectifiers, where harmonic current distortion needs to be reduced to defined limits. The high power filter modules are particularly suitable when no room for packaged filters is available. The Schaffner solution can conveniently be incorporated into cabinets, which allow the filter components to be wired along with the overall electrical wiring job and to be cooled by jointly utilizing the overall cooling concept.

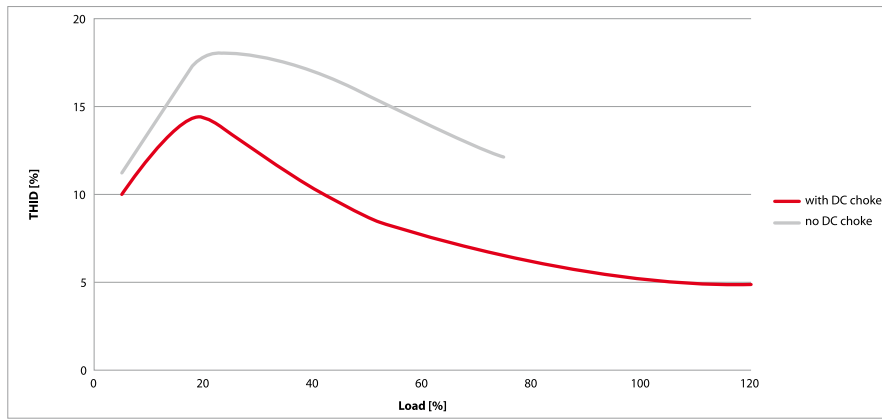
Typical applications include higher power AC and DC motor drives with either six diode used e.g. in HVAC, water/wastewater, oil & gas, or mission critical factory automation equipment. In addition, ECOsine® filters can help to reduce thermal and electrical overload caused by harmonic currents in installations involving UPS, high power rectifiers and other non-linear three-phase power supplies.

Technical specifications

Nominal operating voltage	3x 380 to 500 VAC
Operating frequency	50 Hz +/- 1 Hz
Total harmonic current distortion THID*	~ 5 % @ rated power with Ldc < 15% @ de-rated power without Ldc
Total demand distortion TDD	According to IEEE-519, table 10-3
Voltage tolerance range	3x 342 to 550 VAC
Nominal motor drive input power rating	200 to 400 kW
Efficiency	≥ 99% @ nominal line voltage and power
High potential test voltage	P → E 2500VAC (2 sec)
Protection category	IP00
Cooling	Forced air, to be provided by the installer/integrator
Overload capability	1.6x rated current for 1 minute, once per hour
Ambient temperature range	-25°C to +40°C fully operational -25°C to +85°C transport and storage +40°C to +60°C de-rated operation**
Flammability corresponding to	UL 94V-2 or better
Design corresponding to	UL 508c, EN61558-2-20, CE (LVD 2006/95/EC)
SCCR***	100 kA
Earthing System	TN, TT, IT

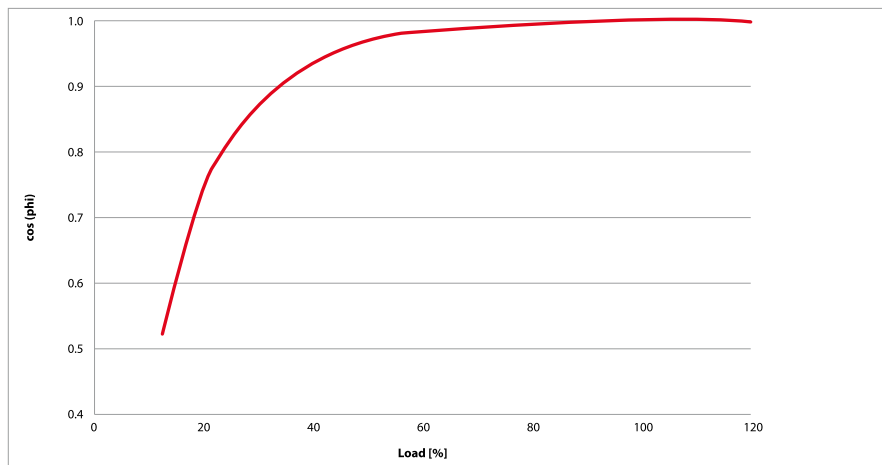
* System requirements: THVD <2%, line voltage unbalance <1%
 Note: performance specifications in this brochure refer to six-pulse diode rectifiers
 ** Iderated = Inominal * √((85°C-Tamb)/45°C)
 *** External UL-rated fuses required

Performance characteristics



THID - Total harmonic current distortion

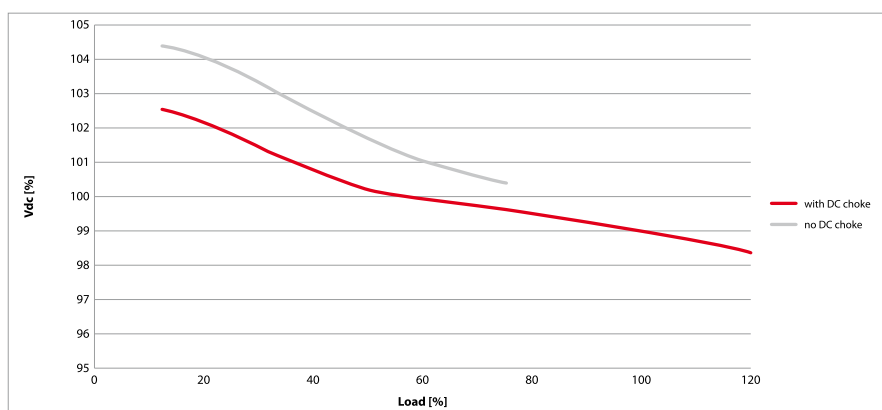
ECOsine® high power passive harmonic filter performance is optimized for rectifiers/motor drives with a dc-link choke. In such applications, a THID of roughly 5% can be expected. The use of a dc-link choke is highly recommended. In a system without L_{dc} , the filter module has to be derated to max. 70% of its nominal power rating. In such applications, a THID of 10...15% can be expected.



Displacement power factor

At full load, ECOsine® filters yield unity power factor. At lower load levels, the capacitive current into the power capacitors of the trap circuit cause a leading displacement power factor. This is the case with all types of passive filters with large capacitors. However, compared to traditional filters the useful range of Schaffner ECOsine® is much extended (cos phi >0.9 from 35 to 100% of rated load).

ECOsine® filters allow for trap disconnect at light load to avoid low DPF situations if required. This feature can be provided by the installer using a capacitor contactor of suitable size for the trap circuit.



DC-link voltage

ECOsine® harmonic filters have a very low impact on the dc-link voltage of the motor drive. The voltage variation as function of the load is represented in the performance diagram beside. Tolerances are kept narrow in order to ensure that motor drives do not suffer from noise tripping because of under- or over-voltage conditions.

Filter selection table (50 Hz)

Filter	Rated load power* @ 400 VAC/50Hz [kW]	Rated load power* @ 500 VAC/50Hz [kW]	Typ. power loss @ rated load [W]	Weight choke module [kg]	Weight total [kg]
FN 3410-380-99-O	200	250	1040	120	140
FN 3410-470-99-O	250	315	1370	135	157
FN 3410-580-99-O	315	355	1540	160	187
FN 3410-650-99-O	355	400	1550	215	247
FN 3410-710-99-O	400	450	1680	250	285

* Power rating for motor drives with dc-link chokes. If no L_{dc} is available, load power of the filter has to be de-rated to 70% of the specified value above
In this case, the THID will be between 10-15%

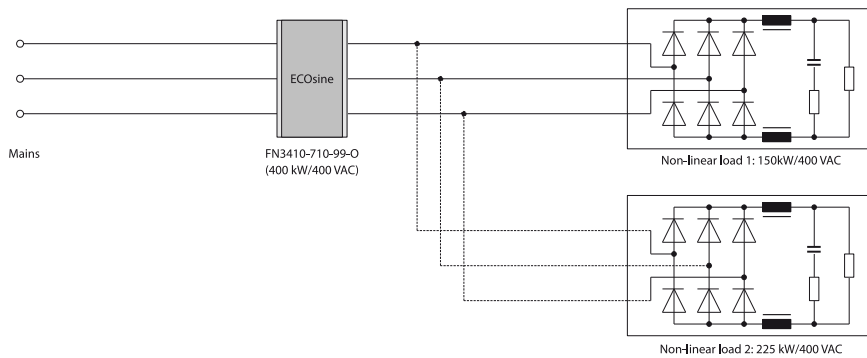
Scope of delivery

Filter	Power [kW]	Freq. [Hz]	Rectifier	Chokes module	Capacitor modules		Damper module	Installation manual
					Modules	Caps		
FN 3410-380-99-O	200	50	Diode	1	2	5	1	√
FN 3410-470-99-O	250	50	Diode	1	2	6	1	√
FN 3410-580-99-O	315	50	Diode	1	2	8	1	√
FN 3410-650-99-O	355	50	Diode	1	3	9	1	√
FN 3410-710-99-O	400	50	Diode	1	3	10	1	√

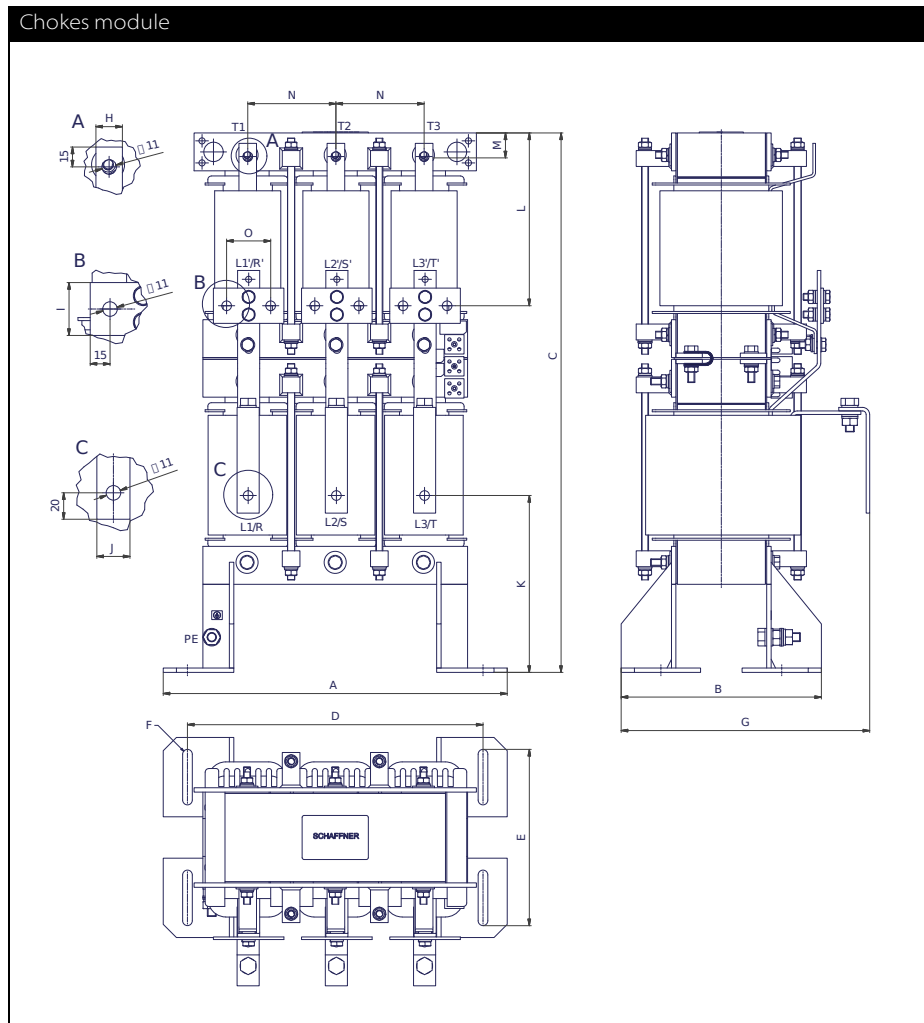
Remark: wiring material, cabinet/enclosure and fan(s) are not included in the scope of delivery.

Application

ECOsine® filters are best installed directly at the input of 6-pulse rectifiers. It is possible to connect several non-linear loads (e.g. motor drives) in parallel. In this case the rating of the filter must match the sum of the power ratings of loads connected to it.



Mechanical data



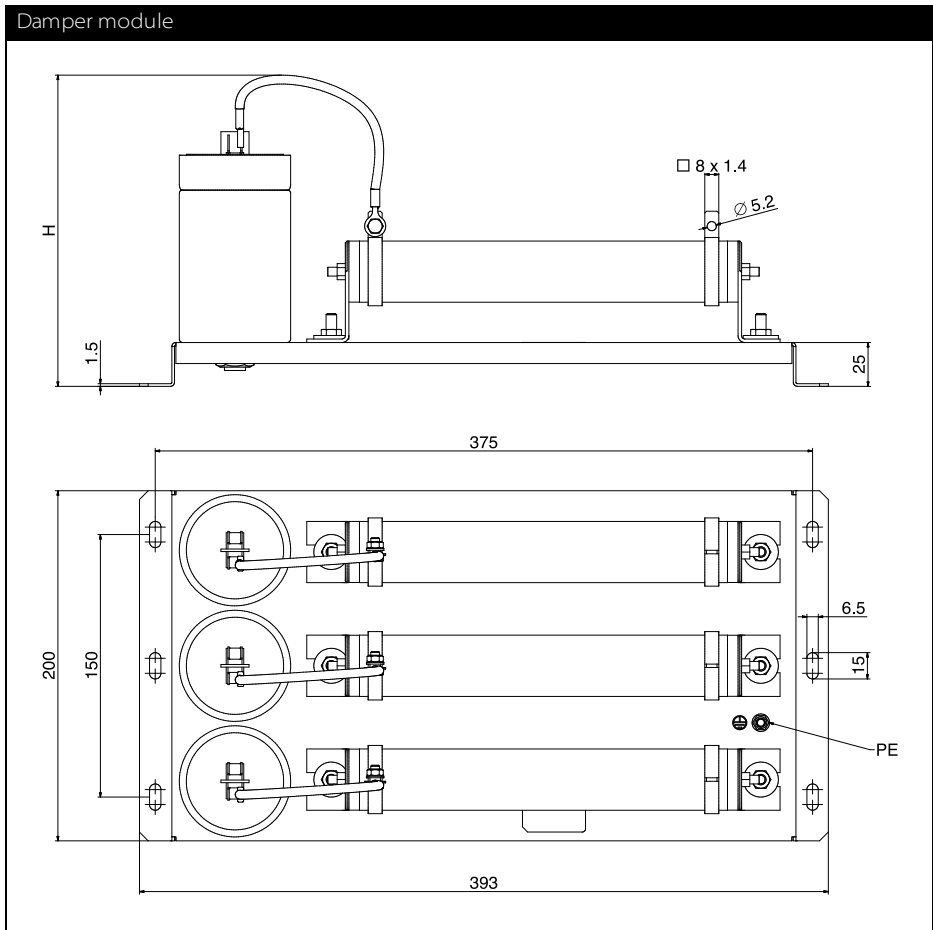
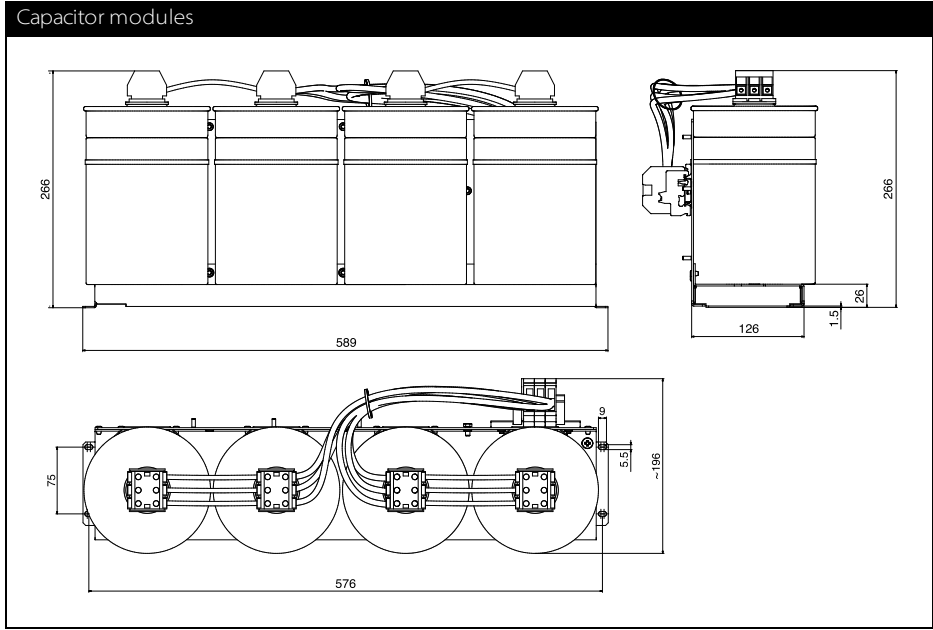
Dimensions of chokes module

	200 kW	250 kW	315 kW	355 kW	400 kW
A	390 ±1	390 ±1	390 ±1	590 ±1	590 ±1
B	227 ±2	212 ±2	227 ±2	248 ±2	268 ±2
C	<620	<725	<725	<750	<750
D	335 ±1	335 ±1	335 ±1	535 ±1	535 ±1
E	175	175	175	200	200
F	M10 +1	M10 +1	M10 +1	M10 +1	M10 +1
G	<300	<300	<300	<300	<300
H	20	20	20	20	20
I	40	40	40	40	40
J	25	25	25	25	30
K	200 ±5	240 ±5	240 ±5	290 ±5	290 ±5
L	195 ±5	240 ±5	240 ±5	200 ±5	210 ±5
M	25 ±3	35 ±3	35 ±3	35 ±3	35 ±3
N	100	120	120	140	140
O	50	50	50	70	80
Weight	~ 120kg	~ 135kg	~ 160kg	~ 215kg	~ 250kg

All dimensions in mm; 1 inch = 25.4mm

PE bolt M10

Tolerances according to: ISO 2768-m (EN 22768-m)



Filters 50 Hz	H
FN 3410-380-99-O	< 145
FN 3410-470-99-O	< 145
FN 3410-580-99-O	< 145
FN 3410-650-99-O	< 160
FN 3410-710-99-O	< 160

Installation

Detailed installation and wiring instructions as well as cooling requirements can be found in the Installation Manual available from every Schaffner sales point or from www.mycosine.com

Important

Forced cooling is required for the thermal management of the magnetic components. Needed fan(s) are not in the scope of delivery. Cooling devices have to be properly selected and installed by the systems integrator. Please consult the Schaffner installation manual for cooling requirement details

Please visit www.schaffner.com to find more details on filter connectors



Headquarters, global innovation and development center

Switzerland

Schaffner Group

Nordstrasse 11
4542 Luterbach
T +41 32 6816 626
F +41 32 6816 630
info@schaffner.com
<http://www.schaffner.com>



Sales and application centers

China

Schaffner EMC Ltd. Shanghai

T20-3, No 565 Chuangye Road
Pudong New Area
201201 Shanghai
T +86 21 3813 9500
F +86 21 3813 9501 / 02
cschina@schaffner.com
<http://www.schaffner.com.cn/>

Finland

Schaffner Oy

Sauvonrinne 19 H
08500 Lohja
T +358 19 35 72 71
finlandsales@schaffner.com

France

Schaffner EMC S.A.S.

112 Quai de Bezons
Boîte postale 133
95100 Argenteuil
T +33 1 34 34 30 60
F +33 1 39 47 02 28
francesales@schaffner.com

Germany

Schaffner Deutschland GmbH

Schoemperlenstrasse 12B
76185 Karlsruhe
T +49 721 56910
F +49 721 569110
germanysales@schaffner.com

Italy

Schaffner EMC S.r.l.

Via Galileo Galilei 47
20092 Cinisello Balsamo (MI)
T +39 02 66 04 30 45/47
F +39 02 61 23 943
italysales@schaffner.com

Japan

Schaffner EMC K.K.

1-32-12, Kamiyama, Setagaya-ku
7F Mitsui-seimei Sangenjaya Bldg.
154-0011 Tokyo
T +81 3 5712 3650
F +81 3 5712 3651
japansales@schaffner.com
<http://www.schaffner.jp>

Singapore

Schaffner EMC Pte Ltd.

Blk 3015A Ubi Road 1
05-09 Kampong Ubi Industrial Estate
408705 Singapore
T +65 6377 3283
F +65 6377 3281
singaporesales@schaffner.com

Spain

Schaffner EMC España

Calle Caléndula 93, Miniparc III, Edificio E,
Alcobendas
Miniparc III, Edificio E
El Soto de la Moraleja
Alcobendas
28109 Madrid
M +34 618 176 133
T +34 917 912 900
F +34 917 912 901
spainsales@schaffner.com

Sweden

Schaffner EMC AB

Turebergstorg 1, 6
19147 Sollentuna
T +46 8 5792 1121 / 22
F +46 8 92 96 90
swedensales@schaffner.com

Switzerland

Schaffner EMV AG

Nordstrasse 11
4542 Luterbach
T +41 32 6816 626
F +41 32 6816 641
sales@schaffner.ch

Taiwan R.O.C.

Schaffner EMV Ltd.

6 Floor, No. 413
Rui Guang Road
114 Neihu District Taipei City
T +886 2 87525050
F +886 2 87518086
taiwansales@schaffner.com

Thailand

Schaffner EMC Co. Ltd.

Northern Region Industrial Estate
67 Moo 4 Tambon Ban Klang
Amphur Muang P.O. Box 14
51000 Lamphun
T +66 53 58 11 04
F +66 53 58 10 19
thailandsales@schaffner.com

UK

Schaffner Ltd.

5 Ashville Way
Molly Millars Lane
Wokingham
RG41 2PL Berkshire
T +44 118 9770070
F +44 118 9792969
uksales@schaffner.com
<http://www.schaffner.uk.com>

USA

Schaffner EMC Inc.

52 Mayfield Avenue
08837 Edison, New Jersey
T +1 800 367 5566
T +1 732 225 9533
F +1 732 225 4789
usasales@schaffner.com
<http://www.schaffner.com/us>

Schaffner MTC LLC

6722 Thirlane Road
24019 Roanoke, Virginia
T +1 276 228 7943
F +1 276 228 7953
<http://www.schaffner-mtc.com>

Schaffner Trencos LLC

2550 Brookpark Road
44134 Cleveland, Ohio
T +1 216 741 5282
F +1 216 741 4860
www.schaffner-trencos.com

To find your local partner within Schaffner's global network: www.schaffner.com

© 2014 Schaffner Group

The content of this document has been carefully checked and understood. However, neither Schaffner nor its subsidiaries assume any liability whatsoever for any errors or inaccuracies of this document and the consequences thereof. Published specifications are subject to change without notice. Product suitability for any area of application must ultimately be determined by the customer. In all cases, products must never be operated outside their published specifications. Schaffner does not guarantee the availability of all published products. This disclaimer shall be governed by substantive Swiss law and resulting disputes shall be settled by the courts at the place of business of Schaffner Holding AG. Latest publications and a complete disclaimer can be downloaded from the Schaffner website. All trademarks recognized.